

CLAIMS

What is claimed is:

- 5 1. An implantable cardiac device, comprising:
 an implantable housing;
 a first electrode coupled to the housing and a second electrode;
 monitoring circuitry coupled to the first and second electrodes, the first and
 second electrodes configured for cardiac activity sensing when the device is
10 operated in a monitoring mode;
 energy delivery circuitry coupled to the first and second electrodes, the first
 and second electrodes configured for cardiac activity sensing and energy delivery
 when the device is operated in an energy delivery mode;
 a lead interface coupled to the housing, the lead interface configured to
15 receive a cardiac lead; and
 a controller coupled to the lead interface, monitoring circuitry, and energy
 delivery circuitry, the controller transitioning operation of the device from the
 monitoring mode to the energy delivery mode at least in part in response to coupling
 the cardiac lead to the lead interface.
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2. The device of claim 1, further comprising detection circuitry provided in
 the housing and coupled to the first and second electrodes, the detection circuitry
 configured to receive the cardiac signals.
- 25 3. The device of claim 2, further comprising memory provided in the
 housing and coupled to the detection circuitry, the memory configured to store
 selected cardiac signals.

4. The device of claim 2, further comprising a programmable filter coupled to the detection circuitry, the programmable filter configurable in a first filtering mode for monitoring associated with the monitoring mode and configurable in a second filtering mode for cardiac event detection associated with the energy delivery mode.

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5. The device of claim 1, further comprising a mode switch coupled to the controller, the mode switch configured to transition the cardiac device between the monitoring mode and the energy delivery mode.

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6. The device of claim 1, further comprising a transceiver that receives a transmit request signal and transmits the contents of the memory to a patient-external device in response to receipt of the transmit request signal.

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7. The device of claim 1, further comprising a receiver coupled to the controller, the controller switching the cardiac device between the monitoring mode and the energy delivery mode in response to the receiver receiving a switch request signal.

8. An implantable cardiac device, comprising:
an implantable housing;
a lead system coupled to the housing;
5 a first electrode coupled to the lead system, and a second electrode;
detection circuitry provided in the housing and coupled to the first and
second electrodes, the detection circuitry configured to receive the cardiac signals
sensed by the first and second electrodes;
memory provided in the housing and coupled to the detection circuitry,
10 the memory configured to store selected cardiac signals;
therapy circuitry provided in the housing and coupled to the detection
circuitry, the therapy circuitry configured to provide a cardiac stimulation therapy; and
a controller that transitions the cardiac device between a first operating
mode and a second operating mode, the first operating mode associated with loop
15 recording cardiac activity and non-enablement of the therapy circuitry, and the
second operating mode associated with enablement of the therapy circuitry.

9. The device of claim 8, wherein the second electrode is provided in or
on the housing.

10. The device of claim 8, wherein the first and second electrodes are
provided in or on the housing, the second electrode electrically isolated from the first
electrode.

11. The device of claim 8, further comprising a transmitter that transmits
the contents of the memory to a patient-external device.

12. The device of claim 8, further comprising a transceiver that receives a transmit request signal and transmits the contents of the memory to a patient-external device in response to receipt of the transmit request signal.

5 13. The device of claim 8, further comprising a receiver configured to receive a switch request signal, the controller switching the cardiac device between the first operating mode and the second operating mode in response to the receiver receiving the switch request signal.

10 14. The device of claim 8, further comprising a programmable filter coupled to the detection circuitry, the programmable filter configurable in a first filtering mode and a second filtering mode.

15 15. The device of claim 14, further comprising a receiver configured to receive a program signal, the controller configuring the filter from the first filtering mode to the second filtering mode in response to receipt of the program signal.

20 16. The device of claim 8, wherein the controller comprises a hardware switch in or on the housing.

25 17. The device of claim 8, wherein the controller comprises a software switch configured to switch the cardiac device between the first operating mode and the second operating mode.

30 18. The device of claim 8, wherein the detection circuitry is configured to select signals associated with cardiac arrhythmic events as the selected cardiac signals for storage.

19. The device of claim 8, further comprising a lead coupled to the therapy circuitry.

20. The device of claim 19, wherein the lead comprises a pacing lead.

21. The device of claim 19, wherein the lead comprises a defibrillation or cardioversion lead.

22. The device of claim 19, wherein the lead is configured to support bi-ventricular pacing therapy.

23. An implantable cardiac device, comprising:

an implantable housing;

a header coupled to the housing;

5 a controller in the housing;

a first electrode and a second electrode, the first and second electrodes adapted to at least sense cardiac signals;

detection circuitry provided in the housing and coupled to the controller and the first and second electrodes, the detection circuitry configured to receive the
10 cardiac signals;

memory provided in the housing and coupled to the controller, the memory configured to store selected cardiac signals;

therapy circuitry provided in the housing and coupled to the controller and the first and second electrodes, the therapy circuitry configured to provide a cardiac
15 therapy; and

an actuatable mode switch that transitions the cardiac device between a first operating mode and a second operating mode, the first operating mode disabling the therapy circuitry and associated with cardiac activity monitoring and the second operating mode enabling the therapy circuitry and associated with cardiac therapy
20 delivery.

24. The device of claim 23, wherein the first electrode is located in or on the housing and the second electrode is coupled to the housing using the header.

25 25. The device of claim 23, wherein the first and the second electrode are coupled to the housing using the header.

26. The device of claim 23, wherein the header is configured to connect a cardiac lead to the therapy circuitry and to couple the second electrode to the housing.

5 27. The device of claim 23, wherein the header is configured to connect a cardiac lead to the therapy circuitry and to couple the first and second electrodes to the detection circuitry.

10 28. The device of claim 23, wherein the header is configured to connect a cardiac lead to the therapy circuitry.

29. The device of claim 28, wherein the cardiac lead comprises a defibrillation or cardioversion lead.

15 30. The device of claim 28, wherein the cardiac lead comprises a pacing lead.

20 31. The device of claim 28, wherein the cardiac lead comprises a first and second portion, the first and second portions configured to provide resynchronization pacing therapy.

32. The device of claim 28, wherein the cardiac lead comprises a memory, the memory comprising a code that actuates the mode switch.

25 33. The device of claim 23, wherein the mode switch is provided in or on the header, the header configured to connect a cardiac lead to the therapy circuitry, wherein connecting the therapy lead actuates switching the cardiac device between the first operating mode and the second operating mode.

34. The device of claim 23, wherein the mode switch comprises a hardware switch.

5 35. The device of claim 23, wherein the mode switch comprises a software switch.

36. The device of claim 23, further comprising a transmitter configured to transmit contents of the memory to a patient-external device.

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37. The device of claim 23, further comprising a transceiver configured to receive a transmit request signal and transmit the contents of the memory to a patient-external device in response to receipt of the transmit request signal.

38. A cardiac system, comprising:

an implantable cardiac device configured to operate in a first operating mode and a second operating mode, the first operating mode associated exclusively with cardiac activity monitoring and the second operating mode associated with cardiac monitoring and therapy delivery, the implantable cardiac device comprising:

a housing;

a first electrode and a second electrode coupled to the housing, and configured to sense cardiac signals;

detection circuitry and energy delivery circuitry respectively provided in the housing;

a transceiver; and

a controller provided in the housing and coupled to the transceiver and the detection and energy delivery circuitry, the controller configured to store the cardiac signals in a memory and to transmit the cardiac signals in response to a transmit request signal; and

a patient-external device configured to send the transmit request signal to the transceiver.

39. The system of claim 38, wherein the patient-external device comprises a patient actuatable trigger, the trigger initiating the transmit request signal upon actuation of the trigger.

40. The system of claim 38, wherein the patient-external device comprises a patient actuatable trigger, the trigger initiating a storage request signal to the controller upon actuation of the trigger, the controller storing the cardiac signals in the memory in response to receipt of the storage request signal.

41. The system of claim 38, further comprising a programmable filter coupled to the first and second electrodes and to the transceiver, the programmable filter configured to filter the cardiac signals, wherein the transceiver is further configured to receive a program signal and program the filter from a first filter configuration to a second filter configuration in response to the program signal.

42. A cardiac monitoring and stimulation method, comprising:
providing an implantable cardiac device;
operating the cardiac device in a first mode as a loop recorder for
10 monitoring cardiac activity and storing selected cardiac events;
enabling the implantable cardiac device to operate in a second mode as a cardiac rhythm management system; and
operating the cardiac device in the second mode to monitor cardiac activity and provide cardiac stimulation therapy once enabled.

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43. The method of claim 42, further comprising selecting cardiac events for storing via patient request.

44. The method of claim 42, further comprising continuously recording
20 cardiac events when operating in the first mode, wherein storing selected cardiac events comprises storing the most recent loop recording.

45. The method of claim 42, further comprising connecting a lead to the cardiac device, wherein switching the cardiac device between the first cardiac monitoring mode and the second mode is disabled until the lead is connected to the cardiac device.

46. The method of claim 42, wherein the cardiac stimulation therapy comprises a defibrillation or cardioversion therapy.

47. The method of claim 42, wherein the cardiac stimulation therapy comprises an antitachycardia pacing therapy.

48. The method of claim 42, wherein the cardiac stimulation therapy comprises a resynchronization pacing therapy.

49. A method, comprising:
providing an implantable cardiac device;
monitoring cardiac activity of a patient using the cardiac device;
storing cardiac event data in a memory of the cardiac device;
diagnosing, using the stored cardiac event data, the patient as having a condition requiring use of a cardiac stimulation device; and
configuring the cardiac device to operate as the cardiac stimulation device.

50. The procedure of claim 49, wherein configuring the cardiac device comprises switching the device between a first operating mode associated with cardiac activity monitoring and a second operating mode associated with cardiac therapy delivery.

51. The procedure of claim 50, wherein the switching comprises changing a hardware switch from a first position to a second position.

5 52. The procedure of claim 50, wherein the diagnosis is performed at least in part by use of the implanted cardiac device.

53. The procedure of claim 50, further comprising transmitting the stored cardiac event data to a patient-external device.

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54. The procedure of claim 50, wherein the switching comprises updating a software program.

55. The procedure of claim 49, further comprising implanting an
15 endocardial lead in the patient and connecting the endocardial lead to the cardiac device.

56. The procedure of claim 49, further comprising implanting an epicardial lead in the patient and connecting the epicardial lead to the cardiac device.

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57. The procedure of claim 49, further comprising implanting a subcutaneous lead in the patient and connecting the subcutaneous lead to the cardiac device.

58. A cardiac device, comprising:
an implantable housing, the implantable housing comprising:
means for implantably detecting cardiac electrograms;
5 means for monitoring the detected electrograms;
means for transmitting the recorded electrograms to a patient-external
device;
means for providing cardiac stimulation; and
means for switching the cardiac device between a monitoring mode
10 and a cardiac stimulation mode.

59. The device of claim 58, wherein the means for switching comprises a hardware switch.

15 60. The device of claim 58, wherein the means for switching comprises a software switch.

61. The device of claim 58, wherein the means for switching comprises a proximity switch.
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62. The device of claim 58, wherein the means for recording comprises a patient actuation means for actuating the recording means.